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Study of multi-nucleon knockout reactions of exotic nuclei in the region of Sn

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The experimental data collected during the S515 experiment performed by R3B collaboration at GSI/FAIR represent a great opportunity to obtain nucleon knockout cross sections of exotic nuclei around 132Sn. These cross sections can be used to extract information about short-range correlations (SRCs), which emerge from pairs of nucleons having large relative momentum compared to their centre-of-mass momentum [1]. Recently, several works based on inclusive measurements [2,3] have shown that these SRCs could reduce the single nucleon knockout cross sections by around 50%, depending on the neutron excess (N/Z) of the initial projectile. The S515 data could help us to go further in this investigation because we could correlate the knockout cross sections of one and two nucleons with the number of protons and neutrons detected by CALIFA and NeuLAND and perform complete kinematical studies to separate between SRC events and others involving evaporation of particles. At the moment, the identification of the fragments between FRS and Cave C is done for the 124Sn settings (136Xe fragmentation), as well as charge calibrations for the LOS and R3B-MUSIC detectors and energy calibration for CALIFA crystals. Thus, the resulting yields for different incoming energies and targets can be compared.

[1] M. Duer et al., Nature 560 620 (2018)
[2] J. Díaz-Cortés et al., Physics Letters B 811 (2020) 135962
[3] V. Vaquero et al., Physics Letters B 795 (2019) 356

Topic

Experiment

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